

EU-Rotate_N: Twenty-four month summary report

Objectives:

The aim of this project is to develop and evaluate a model-based decision support system to optimise nitrogen use in both conventional and organic field vegetable rotations across Europe. This will help Member States to minimise hazards to the environment by adopting consistent approaches to improved efficiency of nitrogen use for different production systems and climatic regions of Europe and to optimise production of quality crops while enhancing the economic sustainability of horticultural production within the EU.

Results and Milestones:

The project commenced on the 1st January 2003. During the 12 to 24 month reporting period two full participant meetings were in Spain and Denmark. A project website is established at www.hri.ac.uk/eurotate. The second project newsletter was published in August 2004. Five out of six milestones for this period have been met, with the sixth now expected in month 28 (April 2005). Six out of the seven deliverables have been met; we have rescheduled the seventh for month 30. The research is divided into five workpackages, a brief report of progress is described below.

Workpackage 1 involves the compilation and integration of recent theories and knowledge of soil-crop-atmosphere interactions. Apart from a few minor changes that are required for the water module, all the new sub-modules have been incorporated into the new model. This workpackage is effectively complete.

Workpackage 2 deals with the evaluation of the effects of varying levels of nitrogen supply on product quality and farm income and the development of an economics module. To evaluate the effect of nitrogen supply, we have carried out an extensive review of the scientific literature and experimental data; the results are summarised in the DL5 report. A report for DL9 has also been prepared which investigates various approaches to optimisation of economic and environmental factors. We have agreed the approach and started to programme the economics module.

Workpackage 3 will amend and develop the existing model to facilitate the improved management of N fertiliser and cropping practices in crop rotations. A very large amount of time and effort has been expended in writing and programming both the browser-compatible interface and the new model, even so, due to the complex nature of the programming and the interface, this major part of the project is behind schedule. However, the work is now progressing well and we think there will only be a four month delay in delivering the new model. We expect to make up this lost time during the last year of the project.

Workpackage 4 will assess the new decision support system for fitness of purpose across cropping rotations in Europe. To enable this to take place, large and suitable datasets will be required, so the work within this workpackage was to set up and run rotation field experiments. In 2003 and 2004, field experiments were established and run by NCRI, HDRA, DIAS, ISOR and IVIA, while in Germany, IGZ monitored 10 conventional rotations and BOLAP 12 conventional and 2 organic rotations. The data from these experiments is stored in a newly constructed database and will be used to validate the model during 2005.

Workpackage 5 will evaluate agricultural strategies with respect to N losses and economics. We have collected large amounts of information, both on 'model farms' and Good Agricultural Practice during 2004. This data is now stored in a newly constructed stand-alone MS Access database, the 'scenario' database. We have designed an interface to connect the model and this database although the actual programming of the interface will not start until 2005.

Benefits and Beneficiaries:

The decision support system is intended to benefit growers by allowing rotational planning and optimisation of nitrogen use efficiency, government policy makers on improving Codes of Good Agricultural Practice and key public bodies on developing more effective environmental protection measures

Future Actions (if applicable):

The next reporting period covers months 24 to 36. The main focus will be to complete and then integrate the new browser-compatible graphics user interface (GUI) and model. Model validation will then occupy the majority of the year. We expect to deliver the new model into WP5 in month 40.

We will finalise the algorithm for converting model total dry weight into marketable fresh weight. This will allow the economics sub-module to be incorporated into the new model. We expect to validate this module in month 30.

The results from all the experimental crops will be assessed and used for model validation.

We will finish collecting data on 'model' farms and incorporate it into the scenario Access database. We will then write the software to enable the model and scenario database to communicate.

We will hold two meetings, the first in Italy in March 2005 and the second in England in November 2005. The website will continue to be updated and the third newsletter will be prepared and published in June 2005.